

REMARKS

In response to the office action of October 5, 2009, Applicants have amended claims 1, 4, 7, 16, 23, 36, 38, 40, and 53, cancelled claims 17 and 52, and added new claims 54-56. Support for new claims 54 and 55 can be found at, e.g., page 5, 2nd last paragraph of the specification. Support for new claim 56 can be found at, e.g., page 4, 5th paragraph of the specification. No new matter has been introduced by the above amendments. Claims 1, 3, 4, 6, 7, 9-17, 20-25, 27, 28, 30-51, and 53-56 are presented for examination.

Objection under 35 U.S.C §132(a) and rejection under 35 U.S.C §112, 1st paragraph

The Examiner objects to new claim 52 under 35 U.S.C §132(a) for including new matter and rejects claims 52 and 53 under 35 U.S.C §112, 1st paragraph for failing to comply with the written description requirement. Applicants have incorporated the limitations of claim 52 into independent claims 1, 4, 7, 16, 23, 36, 38, and 40, and cancelled claim 52. For the purpose of traversing this objection/rejection, Applicants discuss previously pending claim 52.

The Examiner asserts that

“Claim 52 recites the limitation ‘the organic photovoltaic cell is configured so that, during use, light passes through the substrate prior to reaching the organic semiconductor layer’ which is not supported by the original disclosure as filed. Applicant is requested to provide support for this limitation in the claim.”

See the office action, page 3, lines 11-15. Applicants would like to point out that support for previously pending claim 52 can be found at, e.g., page 4, 5th paragraph, page 5, 2nd paragraph, and Fig. 1 of the specification as originally filed. For example, referring to Fig. 1, the specification teaches at page 4, 5th paragraph that “[t]he standard cell is then processed on this [structured] substrate [1] from the bottom up, as, first, a bottom electrode 2, which is implemented as semitransparent (e.g. of ITO) for the case in which the side on which substrate 1 is located is the light-incident side of the photovoltaic component. Disposed thereon in this embodiment is ... the semiconductor layer 4 and a second electrode 3b and/or 5” (emphasis added). It would have been apparent to one skilled in the art that a “light-incident side of the photovoltaic component” described in the present specification is a side which light passes through to reach the semiconductor layer 4. In other words, one would readily recognize that the specification as

originally filed teaches that light passes through structured substrate 1 shown in Fig. 1 prior to reach the organic semiconductor layer 4. Thus, contrary to the Examiner's assertion, previously pending claim 52 is fully supported by the specification as originally filed. Accordingly, Applicants request reconsideration and withdrawal of this objection/rejection.

Rejections under 35 U.S.C. §103(a)

Claims 1, 3, 4, 6, 7, 9-17, 20-25, 27, 28, and 30-53 are rejected as being obvious on four grounds, each of which is traversed below.

I

The Examiner rejects claims 1, 3, 4, 6, 7, 9, 10, 12-15, 21, 23-25, 27, 28, 30-43, and 45-53 under 35 U.S.C. §103(a) as being unpatentable over Mizuno in view of Shaheen and Shinohara with evidentiary support from Peterson.¹

Independent claims 1, 4, 7, 23, 36, 38, and 40 are discussed first. These claims, as amended, recite a photovoltaic component or cell that includes a flexible, structured substrate and a semiconductor. The photovoltaic component or cell is configured so that, during use, light passes through the flexible, structured substrate prior to reaching the organic semiconductor.

Applicants do not concede that it would have been obvious to combine Mizuno, Shaheen, Shinohara, and Peterson in the matter suggested by the Examiner. However, even if these four references somehow were combined, the result would still not have been the photovoltaic component or cell required by amended claims 1, 4, 7, 23, 36, 38, and 40.

Mizuno describes a thin film semiconductor device having a diffraction grating 15. *See, e.g.,* the abstract and FIG. 2. However, as shown in FIG. 2 in Mizuno, the diffraction grating 15 is located at a side opposite to the light-incident side of Mizuno's device. In other words, light reaches the diffraction grating 15 after, not prior to, reaching the semiconductor in Mizuno's solar cell 10.

Shinohara describes a solar cell in which an aluminum film having a texture structure is used as a photoreflective electrode. *See, e.g.,* column 7, lines 41-43 and FIG. 2. One skilled in the art would readily understand that the photoreflective electrode described in Shinohara is used

¹ Applicants have cancelled claim 52. Thus, the rejection of this claim is now moot.

to reflect outgoing light back into the solar cell and therefore does not allow light to pass through, as required by amended claims 1, 4, 7, 23, 36, 38, and 40. Further, Shinohara teaches that this photoreflective electrode is at the side opposite to the light incident side of the solar cell. *See, e.g.*, the abstract. Thus, even if some outgoing light somehow passes through this photoreflective electrode, the light would pass through the photoreflective electrode after, not prior to, reaching the semiconductor layer in Shinohara's solar cell.

Finally, both Shaheen and Peterson are entirely silent on a flexible, structured substrate, let alone a solar cell configured so that, during use, light passes through the flexible, structured substrate prior to reaching the organic semiconductor, as required by amended claims 1, 4, 7, 23, 36, 38, and 40.

In sum, none of Mizuno, Shaheen, Shinohara, and Peterson discloses or renders obvious a solar cell configured so that, during use, light passes through the flexible, structured substrate prior to reaching the organic semiconductor, as required by amended claims 1, 4, 7, 23, 36, 38, and 40.

The Examiner asserts that "the limitation 'the organic photovoltaic cell is configured so that, during use, light passes through the substrate prior to reaching the organic semiconductor layer' does not add any structural limitation to the product, and therefore has not been given any patentable weight." *See* the office action, page 18, lines 8-11. Applicants do not concede that this limitation is a functional limitation that does not add any structural limitation. For the sake of discussion, even assuming that this limitation is a function limitation, the Examiner still errs in not given this limitation patentable weight. According to MPEP 2173.05(g),

"[a] functional limitation **must be** evaluated and considered, just like any other limitation of the claim, for what it fairly conveys to a person of ordinary skill in the pertinent art in the context in which it is used. ... It was held that the limitation used to define a radical on a chemical compound as "incapable of forming a dye with said oxidizing developing agent" although functional, was perfectly acceptable because it set definite boundaries on the patent protection sought. *In re Barr*, 444 F.2d 588, 170 USPQ 33 (CCPA 1971)" (emphasis added).

Here, amended claims 1, 4, 7, 23, 36, 38, and 40 require a limitation, i.e., "the organic photovoltaic component or cell is configured so that, during use, light passes through the substrate prior to reaching the organic semiconductor." In other words, these claims recite a photovoltaic component or cell capable of performing the function set forth by this limitation and exclude

those incapable of performing this function. Thus, this limitation sets definite boundaries of the subject matter covered by these claims and therefore is perfectly acceptable. Accordingly, this limitation **must be** evaluated when considering the patentability of claims 1, 4, 7, 23, 36, 38, and 40. However, the Examiner have improperly ignored this limitation in reaching the conclusion that these claims are obvious over four cited references.

Further, one skilled in the art would readily recognize that an photovoltaic component or cell recited in amended claims 1, 4, 7, 23, 36, 38, and 40 must have a structural feature, even though not explicitly recited in these claims, that results in the above function. For example, the structural feature could be that the substrate is semitransparent so that it allows light to pass through and then reach the semiconductor in the photovoltaic component or cell. By contrast, as discussed above, none of the four references, alone or in any combination, describes a photovoltaic cell that meets this limitation required by amended claims 1, 4, 7, 23, 36, 38, and 40. Thus, Applicants have provided sufficient evidence of a structural difference between the photovoltaic component or cell recited in claims 1, 4, 7, 23, 36, 38, and 40 and those described in the references cited by the Examiner.

For at least the reasons set forth above, amended claims 1, 4, 7, 23, 36, 38, and 40 are not obvious over Mizuno in view of Shaheen and Shinohara with evidentiary support from Peterson. As claims 3, 6, 9, 10, 12-15, 21, 24, 25, 27, 28, 30-35, 37, 39, 41-43, and 45-53 depend from claim 1, 4, 7, 23, 36, 38, or 40, they also are not obvious over Mizuno in view of Shaheen and Shinohara with evidentiary support from Peterson. Accordingly, Applicants request reconsideration and withdrawal of this rejection.

II

The Examiner rejects claims 1, 4, 7, 9-11, 16, 17, 20, 22, and 44 under 35 U.S.C. §103(a) as being unpatentable over Shaheen in view of Iida.²

Independent claims 1, 4, 7, and 16 are discussed first. These claims, as amended, recite a photovoltaic component or cell that includes a flexible, structured substrate and a semiconductor. The photovoltaic component or cell is configured so that, during use, light passes through the flexible, structured substrate prior to reaching the organic semiconductor.

² Applicants have cancelled claim 17. Thus, the rejection of this claim is now moot.

As discussed above, Shaheen does not disclose or render obvious a flexible, structured substrate, let alone a photovoltaic component or cell configured so that, during use, light passes through the flexible, structured substrate prior to reaching the organic semiconductor, as required by amended claims 1, 4, 7, and 16.

The Examiner asserts that

“Iida teaches a flexible, glass-covered substrate ... wherein a surface of the substrate is structured (col. 3, lines 18-20) such that the flexible substrate has less tendency toward breakage even when external force is applied ... Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have utilized the flexible, glass-covered substrate of Iida in the photovoltaic cell of Shaheen.”

See the office action, page 19, last two paragraphs. Applicants do not agree that it would have been obvious to combine Shaheen with Iida in the manner suggested by the Examiner. Specifically, Iida describes a trilayer structure having (1) a metal plate, (2) a porous glass layer formed on the metal plate, and (3) a dense glass layer formed on the porous glass layer. *See, e.g.*, Figures 1 and 2, and column 2, lines 2-4. Iida also teaches that its metal plate usually has a thickness of from 10 to 300 μm . *See, e.g.*, column 2, lines 7-9. It would have been apparent to one skilled in the art that a metal plate with such a thickness is not transparent. Indeed, Iida teaches that when using its trilayer structure to form a solar cell, a stainless steel back electrode is formed on this substrate, followed by an amorphous silicon layer and a transparent electrode. *See* column 4, lines 9-16. One skilled in the art would readily recognize that the transparent electrode described in Iida, not the trilayer structure, allows light to be transmitted into its cell. By contrast, Shaheen describes a photovoltaic cell having a transparent glass carrier 1, which allows light to be transmitted into the cell. Thus, one skilled in the art would not have replaced the substrate described in Shaheen (i.e., a transparent glass carrier 1) with the trilayer structure described in Iida at least because the photovoltaic cell thus obtained would prevent light from entering into the cell and therefore would not function. Applicants would like to remind the Examiner that “[i]f proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification.” *See* MPEP, 2143.01 V. Here, because using Iida's trilayer structure in Shaheen's photovoltaic cell would render Shaheen's cell unsatisfactory for its intended purpose,

one skilled in the art would not have combined Iida with Shaheen to provide the photovoltaic component or cell required by amended claims 1, 4, 7, and 16.

Thus, amended claims 1, 4, 7, and 16 are not obvious over Shaheen in view of Iida. As claims 9-11, 20, 22, and 44 depend from claim 1, 4, 7, or 16, they also are not obvious over Shaheen in view of Iida. Accordingly, Applicants request reconsideration and withdrawal of this rejection.

III

The Examiner rejects claims 1, 4, 7, 9-11, 16, 17, 20, 22, and 44 under 35 U.S.C. §103(a) as being unpatentable over Fujimori in view of Iida and Shaheen.²

Independent claims 1, 4, 7, and 16 are discussed first. These claims, as amended, recite a photovoltaic component or cell that includes a flexible, structured substrate and a semiconductor. The photovoltaic component or cell is configured so that, during use, light passes through the flexible, structured substrate prior to reaching the organic semiconductor.

Fujimori describes a dye-sensitized photovoltaic cell having a substrate 2 on the light incident side of the cell. *See, e.g.*, the abstract and Fig. 2. As correctly pointed out by the Examiner, Fujimori does not disclose or render obvious a flexible, structured substrate, let alone a photovoltaic component or cell configured so that, during use, light passes through the flexible, structured substrate prior to reaching the organic semiconductor, as required by amended claims 1, 4, 7, and 16.

Neither Shaheen or Iida cures the deficiencies in Fujimori. As discussed above, Similar to Fujimori, Shaheen also does not disclose or render obvious a photovoltaic component or cell configured so that, during use, light passes through the flexible, structured substrate prior to reaching the organic semiconductor, as required by amended claims 1, 4, 7, and 16.

As discussed above, Iida describes a trilayer structure that is not transparent. Thus, one skilled in the art would not have replaced the substrate described in Fujimori (i.e., substrate 2 which is on the light incident side of Fujimori's cell) with the trilayer structure described in Iida at least because the photovoltaic cell thus obtained would prevent light from entering into the cell and therefore would not function. Because using Iida's trilayer structure in Fujimori's photovoltaic cell would render Fujimori's cell unsatisfactory for its intended purpose, one skilled

in the art would not have combined Iida with Fujimori to provide the photovoltaic component or cell required by amended claims 1, 4, 7, and 16.

Thus, amended claims 1, 4, 7, and 16 are not obvious over Fujimori in view of Shaheen and Iida. As claims 9-11, 20, 22, and 44 depend from claim 1, 4, 7, or 16, they also are not obvious over Fujimori in view of Shaheen and Iida. Accordingly, Applicants request reconsideration and withdrawal of this rejection.

IV

The Examiner rejects claims 1, 4, 7, 11, and 22 under 35 U.S.C. §103(a) as being unpatentable over Kambe in view of Bloch and Nakamura.

Independent claims 1, 4, and 7 are discussed first. These claims, as amended, recite a photovoltaic component or cell that includes a flexible, structured substrate and a semiconductor. The photovoltaic component or cell is configured so that, during use, light passes through the flexible, structured substrate prior to reaching the organic semiconductor.

Kambe describes a polymer based photovoltaic cell having a transparent substrate 114 on the light incident side of the cell. *See, e.g.*, Fig. 1 and column 3, lines 41-45. As correctly pointed out by the Examiner, Kambe does not disclose or render obvious a flexible, structured substrate, let alone a photovoltaic component or cell configured so that, during use, light passes through the flexible, structured substrate prior to reaching the organic semiconductor, as required by amended claims 1, 4, and 7.

Neither Bloch or Nakamura cures the deficiencies in Kambe. Similar to Kambe, Nakamura is silent on a flexible, structured substrate. In other words, Nakamura also does not disclose or render obvious a photovoltaic component or cell configured so that, during use, light passes through the flexible, structured substrate prior to reaching the organic semiconductor, as required by amended claims 1, 4, and 7.

Bloch describes a thin film photoconductive device with a substrate having correlated roughness for enhancing the absorption of solar light. *See, e.g.*, the abstract. It also teaches that the enhanced light absorption is resulted from light scattered from a randomly textured surface being trapped in the active layer of the device by internal reflection. *See* column 1, lines 23-27. Thus, it would have been apparent to one skilled in the art that the substrate described in Bloch is used to reflect outgoing light back into its device and therefore does not allow light to pass

through, as required by amended claims 1, 4, and 7. Indeed, Bloch explicitly teaches that a substrate having a correlated roughness structure “can be used as a backing for a thin-film silicon solar cell.” *See* column 4, lines 13-16; emphasis added. In view of the teaching in Bloch that its correlated roughness structure can be used as a backing for a solar cell, one skilled in the art at most would include Bloch's structure as a backing in Kambe's solar cell (i.e., beneath electrode 110 in Kambe's solar cell). However, in the solar cell thus obtained, light would pass through transparent electrode 114 in described in Kambe, but not through Bloch's correlated roughness structure, to reach its semiconductors. In other words, the solar cell thus obtained still does not meet the limitation “light passes through the flexible, structured substrate prior to reaching the organic semiconductor,” as required by amended claims 1, 4, and 7.

Thus, amended claims 1, 4, and 7 are not obvious over Kambe in view of Bloch and Nakamura. As claims 11 and 22 depend from claim 7, they also are not obvious over Kambe in view of Bloch and Nakamura. Accordingly, Applicants request reconsideration and withdrawal of this rejection.

CONCLUSION

Applicants submit that this application is now in condition for allowance, which action is requested.

Any circumstance in which Applicants have: (a) addressed certain comments of the Examiner does not mean that Applicants concede other comments of the Examiner; (b) made arguments for the patentability of some claims does not mean that there are not other good reasons for the patentability of those claims and other claims; or (c) amended or canceled a claim does not mean that Applicants concede any of the Examiner's positions with respect to that claim or other claims.

This document is filed concurrently with a Request for Continued Examination (“RCE”). The \$810.00 fee for the RCE is being paid concurrently herewith on the Electronic Filing System (EFS) by way of Deposit Account authorization.

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Respectfully submitted,

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